

HEART HEALTH

*A Summary of the
British Columbia
Heart Health Survey*



Honourable John Jansen
Minister of Health and
Minister Responsible for Seniors

OVERVIEW

Heart disease is the leading cause of death in British Columbia. In 1988, just under 6,700 British Columbians died as a result of heart related diseases.

Smoking, high blood pressure, high cholesterol levels, lack of physical activity, excessive weight and alcohol abuse contribute to heart disease.

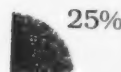
The British Columbia Heart Health Survey* was conducted in 1989 to find out the number of people who might be at risk for heart disease and how knowledgeable they are about this disease.

* A representative, random survey of British Columbians aged 18 to 74 years (excluding those living on Indian Reserves, in institutions or military camps).

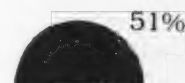
For British Columbians aged 18 to 74 years, the findings of the Survey show that:

Smoking

- 25% (540,000) smoke at least one cigarette per day. Females, 18 to 34 years, are the largest group of regular smokers (30%) while middle aged men are the heaviest smokers (1 in 7 smoke more than 25 cigarettes per day).



Percent of adults who are regular cigarette smokers



Percent of adults aware that cigarette smoking is a cause of heart disease

Cholesterol

- 17% (347,000) have a cholesterol level (6.2mmol/L or 240mgm/dl) which places them at increased risk for heart disease.
- Over 95% know that cholesterol is found in food and are aware that it affects their health. Two-thirds are aware eggs contain cholesterol while only one-third are aware of its presence in pork and beef, and one-half know that it is found in whole milk and cheese.
- 90% are aware that blood cholesterol affects health while only 50% know of its relationship to heart disease, and that cholesterol levels can be lowered by eating fewer fatty foods. Even fewer identify weight reduction (12%) and use of low fat dairy products (20%) as a means of reducing cholesterol levels.



17%

Percent of adults with high risk cholesterol levels



35%

Percent of adults aware that high cholesterol is a cause of heart disease

Blood Pressure

- 14% (302,000) have high blood pressure (diastolic above 90mm Hgm). Of these, 60% have an uncontrolled blood pressure and 25% are unaware of their condition.
- Over 50% are aware that blood pressure is affected by food and alcohol. Of these, 60% are aware that alcohol contributes to high blood pressure, 46% state salt is related to high blood pressure, and only 6% recognize sodium as affecting it.



14%

Percent of adults with high blood pressure



29%

Percent of adults aware that high blood pressure is a cause of heart disease

Alcohol

- 20% (432,000) report drinking 7 or more alcoholic drinks per week and 5% (108,000) consume 20 drinks or more per week. 63% report drinking less than 7 drinks per week.

Weight

- 28% (605,000) are at increased risk of dying, or being ill from a variety of chronic diseases as a result of being overweight. Two-thirds of overweight individuals are trying to lose weight.

Physical Activity

- 71% (1,534,000) say they exercise at least once a week. Men report exercising more strenuously and for longer periods of time than do women.

Socio-economic Differences

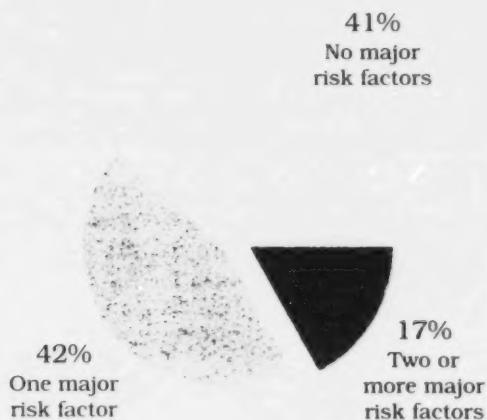
- Young men and women with lower levels of education have more risk factors than the average British Columbian.

Awareness

- There is poor recognition of the major factors contributing to heart disease. Only 51% recognize smoking, 35% cholesterol, and 29% blood pressure as the major contributors of this disease.

Multiple Risk Factors

- Nearly 60% (1,275,000) smoke, have high blood pressure, or have a cholesterol level which puts them at increased risk for heart disease.
- 17% (367,000) have two or more of these risk factors which puts them at an even greater risk for heart disease. This is the same for both men and women and is more common with increasing age.



Percent of Adults at Risk
for Heart Disease

SUMMARY

These findings, which show the widespread prevalence of risk factors in the population, suggest that the high rate of heart disease in the Province is associated with unhealthy lifestyle characteristics and socio-economic factors.

FOR INFORMATION ON WHAT YOU CAN
DO TO REDUCE AND MANAGE YOUR
RISK FOR HEART DISEASE, CONTACT
YOUR LOCAL HEALTH UNIT

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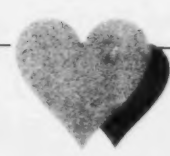


HEART HEALTH

A REPORT OF THE BRITISH COLUMBIA HEART HEALTH SURVEY

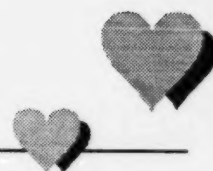


Honourable John Jansen
Minister of Health and
Minister Responsible for Seniors



BRITISH COLUMBIA HEART HEALTH SURVEY REPORT

PRINCIPAL INVESTIGATOR: DR. BRIAN O'CONNOR



MINISTRY OF HEALTH
PROVINCE OF BRITISH COLUMBIA
AND
HEALTH AND WELFARE CANADA

VICTORIA, MARCH, 1990



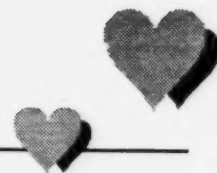
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I. PREFACE



The British Columbia Heart Health Survey was carried out in 1989 by the public health staff of Provincial Health Units and Vancouver, North Shore and Capital Regional District Health Departments under the auspices of Community and Family Health of the Ministry of Health, Province of British Columbia, in collaboration with Health and Welfare Canada.

The British Columbia Heart Health Survey was carried out in the context of the Federal Provincial Heart Health Initiative in which other provinces are participating. The data from this survey and from those already completed in the Atlantic provinces and in Saskatchewan will contribute to a national picture of cardiovascular disease risk in Canada.

The Principal Investigator for the survey was Dr. Brian O'Connor, Medical Health Officer, North Shore Health. Ms. Lynne Blair, Manager, Community Health Strategies, Ministry of Health, was the Survey Coordinator. The Survey was overseen by a Steering Committee comprised of representatives of several divisions within the Ministry of Health, the British Columbia and Yukon Heart Foundation, the University of British Columbia and Statistics Canada.

This report is intended to provide an overview of the main findings of the survey. The results should serve as a basis for discussion at the provincial and national level leading to the development and implementation of strategies and programs to address this major public health issue.

The survey methodology, the results and the conclusions were reviewed by a Data Interpretation Committee to whom special thanks are due. The composition of the Committee was as follows:

Data Interpretation Committee

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Thanks are due to the Public Health
Nurses who carried out the field
procedures, the Provincial Medical
Health Officers for their cooperation and
to Ms. Joan Higgins, the Survey Monitor.

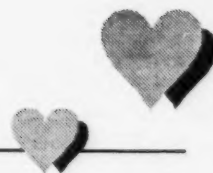
The assistance of the statistical and
computer staff of the Department of
Health Care and Epidemiology,
University of British Columbia, especially
Mr. Kevin Craib and Mr. Thin Lee; Mr.
Michael Alberti, British Columbia
Ministry of Health; Mr. Mukund
Nargundkar, Social Surveys Methods
Division, Statistics Canada; and
Dr. Phil Connelly, Core Lipid Laboratory,
University of Toronto, is gratefully
acknowledged.

Special thanks are also due to Drs.
Christofer Balram, Kevin Hogan, David
MacLean, and Miss Ella MacLeod,
Principal Investigators of the Atlantic
Heart Health Surveys, who kindly shared
the protocols used in their studies; Miss
Ella MacLeod for conducting the training
workshops for the field staff; and to Dr.
Andres Petrasovits of the Health
Promotion Directorate of Health and
Welfare Canada for his work and
encouragement in the development and
implementation of the survey.

The Ministry of Health extends a
special thanks to the North Shore
Union Board of Health for giving so
generously of Dr. O'Connor's time to
conduct this Survey.



II. EXECUTIVE SUMMARY



The British Columbia Heart Health Survey was conducted in 1989 to estimate the prevalence of cardiovascular disease risk and the level of knowledge and awareness in the adult population ages 18-74. The survey was carried out by the public health staff of Provincial Health Units and Vancouver, North Shore and Capital Regional District Health Departments under the auspices of Family and Community Health of the Ministry of Health, Province of British Columbia, in collaboration with Health and Welfare Canada.

The survey sample was provincial in scope, statistically drawn and it consisted of 2,403 individuals who were interviewed, among whom, 2,069 were seen in a survey clinic. The results showed that slightly less than two in 3 British Columbians (**1,275,000 ages 18-74**) have one or more of the major risk factors (smoking, high blood pressure, elevated blood cholesterol) for ischemic heart disease. The prevalence of high blood pressure was 14% (**302,000**); that of elevated blood cholesterol 46% (**994,000**) and of smoking 25% (**540,000**). The prevalence of overweight was 28% and of sedentary lifestyle 29%. The prevalence of some of the risk factors appeared to be higher among those who had attained lower levels of education.

Among those with high blood pressure, 57% were not controlled and 23% were unaware of their condition. Non-pharmacological approaches to control of high blood pressure did not

seem to be widespread. Over 60% of middle age males have elevated blood cholesterol levels and 23% have a level which places them at high risk. The prevalence of smoking among females, which traditionally has lagged behind that of males, has now caught up with the rates for males in every age group. While overall, 36% of individuals are trying to loose weight it is worth noting that among females with normal weight, over 30% are also trying to reduce.

Knowledge and awareness of the causes and consequences for heart disease is low. There was poor recognition of the major factors; for example, only 51% identified smoking, 35% identified blood cholesterol and 29% noted high blood pressure. While most individuals had heard of cholesterol, only a minority were able to say in which foods it is found.

The data from the British Columbia Heart Health Survey raise a wide range of issues that need to be addressed. The widespread prevalence of risk factors strongly suggests that the high rate of cardiovascular disease in the province (when compared with other industrialized countries) is due, by and large to unhealthy lifestyle characteristics.

A public health approach to deal with prevention of cardiovascular disease is required. This approach should be three pronged in that it should address: the population at large, those at high risk and those disadvantaged groups in whom risk factors are known to cluster.

Targeting the population at large is seen as the cornerstone strategy for an integrated approach to prevention of cardiovascular disease addressing all of the modifiable risk factors, namely smoking, high blood pressure, diabetes, elevated cholesterol, obesity and lack of physical activity. There as an additional requirement to detect and provide medical intervention for the smaller proportion of the population that are at high risk and to develop innovative programs which address inequalities in heart health.



III. INTRODUCTION



In Canada, as in most industrialized countries, non-communicable chronic diseases are the leading cause of premature death and disability. Mortality from cardiovascular disease accounts for about 43% of all deaths (Nicholls, et al., 1988).

As in the rest of Canada, cardiovascular disease mortality in British Columbia has been steadily declining over the last fifteen years. The decline closely parallels that observed at the national level. The Province experiences lower-than-average death rates from cardiovascular disease than other Canadian provinces. For the period 1985-87, the age-adjusted mortality rates for total cardiovascular disease in British Columbia for males (females) were 259 (154) per 100,000 population. These rates are 15% (11%) below the national average. Even so, cardiovascular disease remains the major cause of death; in 1987 there were about 9,000 deaths due to cardiovascular disease in the Province. In 1984, over 50,000 hospital discharges were due to cardiovascular disease (Nicholls, et al., 1988).

Epidemiological, clinical and laboratory studies have identified elevated blood cholesterol, smoking and high blood pressure as the main independent risk factors for cardiovascular disease. These risk factors are either preventable or controllable (Kaplan and Stamler, 1983).

The widespread prevalence of cardiovascular disease risk factors in

Canada has been documented (Department of National Health and Welfare, 1973; Statistics Canada and Department of National Health and Welfare, 1981; Fitness and Amateur Sport Canada, 1983; Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989; Robitaille et al., 1979).

The public health implications of this widespread prevalence is that the vast majority of cardiovascular disease morbidity and mortality comes not from those at extreme risk, but rather from the majority of individuals with moderate elevations of risk factor levels such as blood cholesterol and blood pressure (Rose, 1981).

The need for a multifactorial, integrated approach to prevention of cardiovascular disease and of non-communicable diseases in general, has been recommended by a number of national and international health policy groups and agencies (Federal Provincial Working Group on the Prevention and Control of Cardiovascular Disease, 1987; World Health Organization 1982, 1985, 1986; European Atherosclerosis Society, 1987; Resolution of the Thirty-Eight World Health Assembly, 1985).

The purpose of the British Columbia Heart Health Survey was to estimate the prevalence and distribution patterns of cardiovascular disease risk factors, including high blood pressure, abnormal levels of blood lipids, smoking and co-morbid conditions, e.g. obesity. The

survey also addressed some aspects of knowledge and awareness of factors that lead to cardiovascular disease risk, e.g. dietary factors.

The survey was carried out by the Public Health Nurses of the Provincial Health Units and the Metropolitan Health Departments under the auspices of Community and Family Health Services of the Ministry of Health in collaboration with the Health Services and Promotion Branch, Health and Welfare Canada.

To permit comparability with the data sets of other provinces which are also doing heart health surveys, the study protocol for the British Columbia Heart Health Survey followed closely the one developed for use in the 1986-89 Atlantic Provinces Heart Health Surveys (Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989; Newfoundland Department of Health, 1990; MacLeod, 1990).

The data processing support was provided by the Department of Health Care and Epidemiology, University of British Columbia. The statistical sample design was prepared by the Social Surveys Methods Division, Statistics Canada. The lipid analyses of blood samples were carried out by the Core Lipid Laboratory, St. Michael's Hospital, Toronto.

A probability sample of 2,403 residents of the province, between ages 18 to 74 (exclusive of those living on Indian Reserves, in institutions and in military camps), was obtained from 22 areas which, for sampling purposes were divided into six strata. The strata represent a cross section of metropolitan, urban and rural areas. Field operations were conducted between February and October, 1989.

The data were collected by public health nurses from the Public Health Units and Departments at a home interview and at a subsequent visit to a survey clinic (**Table 1**). Supervision of survey procedures was provided by the Survey Coordinator and the Principal Investigator. The management of the data flow, including planning, scheduling and reception and dispatch of blood samples was the responsibility of the Survey Monitor. The questionnaires from the Atlantic Heart Health Surveys were modified for use in British Columbia and then field tested.

In addition to documenting the nature and extent of cardiovascular disease risk in the province, the study demonstrates how the Public Health System, with support of existing resources can effectively carry out epidemiological research which is intrinsic to the establishment of goals, development of public health policy and to the planning and evaluation of intervention programs.



IV. SURVEY RESULTS



Response rates

The survey response rates by age and sex and by stratum are shown in **Tables 2 and 3**. Among the 5,204 individuals who were drawn from the files of the Medical Services Plan 57% or a total of 2,969, were located and asked to participate in the survey. Among these, 81%, or 2,403, completed the whole interview and 70%, or 2,069, completed both the interview and the clinic components of the survey.

The response rates at the interview and clinic levels were roughly similar for the different age-sex groups, except for the younger males (18 to 34 years), where the response was lower (**Table 2**). The response rate at the clinic level was appreciably lower in the Vancouver and Victoria Metropolitan areas (**Table 3**).

The socio-demographic characteristics of the participants are given in **Table 4**. About one half of the participants had post secondary education and the vast majority had education beyond the elementary level. About two thirds of the participants reported either full-time or part-time employment at the time of the survey.

Blood pressure

The blood pressure results are shown in **Tables 5 to 10**. The mean values for systolic blood pressure increased with age in both sexes and tended to be higher in males than in

females in the younger and middle age groups (ages 18-34 and 35-64). The mean diastolic blood pressure followed the same pattern as the systolic blood pressure (**Table 5**).

The prevalence of high blood pressure is also shown in **Table 5**. In this report, high blood pressure is defined as diastolic blood pressure equal to or greater than 90 mm Hg and/or on treatment, whether pharmacological or non-pharmacological (weight control or salt restriction) for the purpose of lowering blood pressure.

Using the above definition, the overall prevalence of high blood pressure was 14%, equivalent to **302,000** individuals in the population ages 18 to 74. The prevalence was higher among the elderly (28%-30%). In the middle aged groups, the prevalence was higher in males.

High blood pressure awareness, treatment and control status is given in **Table 6**. The criterion used to define "control" status was diastolic blood pressure less than 90 mm Hg. By this criterion, about three in 5 individuals with high blood pressure were uncontrolled and one in 4 was unaware of his/her condition. The rate of uncontrolled high blood pressure among the treated group was about 25% [$100 \times 14 / (43 + 14)$].

The vast majority of individuals (97%) have had their blood pressure checked sometime in the past. Over two-thirds had their blood pressure checked within the past year, with lower

frequency of measurement in the younger males. Doctors and nurses took virtually all measurements, but only one in 6 individuals reported that the actual blood pressure level had been given to them in numbers (**Table 7**).

Among individuals who were ever told by a health professional that they had high blood pressure, two-thirds reported that they had been prescribed some treatment. At the time of the home interview, fewer than one half of those for whom something had been prescribed were taking drugs, and about one in 3 was not following a treatment regimen (**Table 8**).

The specific treatment advice reported to have been given, was primarily drug therapy. The most common non-pharmacological measures reported as having been prescribed, were salt restriction (23%) and weight control (26%) (**Table 9**).

A slight majority of individuals appreciated that high blood pressure is related to what people eat and drink. It is worth noting that while 46% recognized salt as a factor, only 6% identified sodium. Alcohol was seen as important by about two thirds of individuals (**Table 10**).

Lipids

The results of the blood lipids analyses are shown in **Tables 11 to 18**.

All estimates are based on lipid values for 1,888 participants who reported fasting 8 hours or more, which represents 91 % of clinic attendees.

Table 11 shows that mean total plasma cholesterol level increased with age. In males, the mean values levelled off with age, whereas in females they continued to rise. Mean HDL-cholesterol

level was higher in females than in males for each age-sex group.

Mean LDL-cholesterol values closely paralleled total plasma cholesterol, increasing with age in both sexes, higher in men than in women under age 65 (**Table 12**).

Mean triglycerides values were higher among males than among females in the younger and middle age groups. The reverse pattern was seen in the older age group (**Table 12**).

The cut-off points used in **Tables 13 to 18** to estimate the percentage of the population with varying degrees of risk, are based on criteria suggested by a number of, generally concordant, expert review panels (Canadian Consensus Conference on Cholesterol, 1988; The National Cholesterol Education Program 1988; European Atherosclerosis Society, 1987).

Table 13 shows that 46% of the participants, equivalent to **994,000** individuals in the population ages 18 to 74, had total plasma cholesterol levels above the "desirable" value of 5.2 mmol/L (200 mg/dL). This prevalence increased with age and was higher for males than for females in the younger and middle age groups. In the older age group the prevalence was higher among females.

About three in 10 participants, equivalent to **627,000** individuals in the population ages 18-74, were in the "moderate risk" category for blood cholesterol, i.e. between 5.2 and 6.2 mmol/L (200 to 240 mg/dL).

Seventeen percent (17%) of participants, equivalent to **367,000** individuals in the population ages 18-74, had total plasma cholesterol levels in the "high risk" range, above 6.2 mmol/L (240



mg/dL). This prevalence was higher in older females. In the middle age group the prevalence of "high blood cholesterol" was somewhat higher among males.

About one third of participants, equivalent to **778,000** individuals in the population ages 18 to 74, had a LDL-cholesterol level above the "desirable" value of 3.4 mmol/L (130 mg/dL) and about one in 7, equivalent to **324,000** individuals in the population ages 18-74, was in the "high risk" LDL-cholesterol range, i.e. above 4.1 mmol/L (160 mg/dL). The prevalence of elevated LDL-cholesterol was higher in males than in females in the younger and middle aged groups. Older females had higher prevalence. This is the same pattern of prevalence (**Table 13**) as was observed for total plasma cholesterol (**Table 14**).

About one in 12 participants, equivalent to **173,000** individuals in the population ages 18 to 74, had a HDL-cholesterol under 0.9 mmol/L (35 mg/dL), under which level, individuals are recognized as being at high risk for ischemic heart disease. This prevalence of "low HDL-cholesterol" was higher in males than in females in all the age-sex groups. (**Table 15**).

The distribution of individuals, with all age-sex groups combined, by various levels of LDL-cholesterol and HDL-cholesterol is shown in **Table 16**. About one in 5 participants (21%=100%-59%-20%) or **454,000** individuals in the population were at increased risk of ischemic heart disease either due to low HDL-cholesterol (less than 0.9 mmol/L (35 mg/dL)), high LDL-cholesterol (equal to or greater than 3.4 mmol/L (160 mg/dL)), or both.

Table 17 shows the distribution of individuals, with all the age-sex groups combined, over various levels of total plasma cholesterol and LDL-cholesterol.

Among individuals who were in the "moderate risk" plasma cholesterol range, one in 14 (2/29) was also in the "high risk" LDL-cholesterol group. However, among those in the "high risk" cholesterol range, about three in 4 ((8+5)/16) had LDL-cholesterol in the "high risk" category.

Table 18 shows the distribution of individuals, with all age-sex groups combined, over various levels of total plasma cholesterol and HDL-cholesterol. Among individuals within the "desirable" range with respect to total plasma cholesterol, about one in 13 (4/54) had a low HDL-cholesterol which places them in a "high risk" category for ischemic heart disease.

Knowledge and awareness data on cholesterol are given in **Tables 19 to 23** for all age-sex groups combined.

Most individuals had heard about cholesterol (97%) and among these, one in 3 said that he/she had it measured and one in 8 was told that his/her cholesterol level was high. Among those who reported having had it measured, two thirds also reported that they had been told what their blood cholesterol level was. Among those who were told that their blood cholesterol was elevated three in 4 had some treatment prescribed or advice given and in two out of 5 cases, dietary measures were recommended (**Table 19**).

Among those who had heard about cholesterol, a large majority (96%) were aware that cholesterol is found in foods and, among these, most believe (99%) that it can affect health. About two thirds of individuals believed that cholesterol is found in eggs and one third recognized that it is present in pork and beef. About one half realized that cholesterol is also found in whole milk and cheese (**Table 20**).



A large percentage of individuals (90%) know that cholesterol is present in the blood and among these, virtually everyone (99%) was aware that blood cholesterol affects health. Three in 4 individuals knew that blood cholesterol is related to "hardening" of the arteries and one half were aware of its relationship to heart attacks (**Table 21**).

Among those who had heard about cholesterol, when asked what measures an individual may take to lower his or her cholesterol level, about three in 4 said "eat foods with less cholesterol" and one in 2 said "reduce fatty foods". One in 5 recognized the value of low fat dairy products and one in 10 the value of weight reduction (**Table 22**).

Fat consumption was viewed by a large majority of individuals (93%) as affecting health. About one half of these individuals recognized the relationship between fat consumption on the one hand and elevated blood cholesterol, heart disease and overweight on the other (**Table 23**).

Smoking

The prevalence of regular cigarette smoking was 25%, equivalent to **540,000** individuals in the population ages 18 to 74. For both males and females, the prevalence was higher in the younger and middle aged than in the elderly. The highest rate, 30%, was among females 18-34 years of age (**Table 24**).

Among regular cigarette smokers, about one in 7 was a heavy smoker (over 25 cigarettes per day). The prevalence of heavy smoking was highest for middle aged males (**Table 25**).

Alcohol consumption

The percent distribution of alcohol consumption shows that, on the average, about one in 5 individuals had seven or more drinks per week and that one in twenty had 20 or more drinks per week. Males reported drinking more than females in all age-sex groups (**Table 26**).

Weight

The Body Mass Index (BMI) is recognized as an appropriate indicator to categorize the weight of individuals with respect to possible health risks (Bray, 1985; Department of National Health and Welfare, 1988). The mean values of BMI by age sex groups and the frequency distributions according to BMI levels are given in **Table 27**. Higher mean BMI values were observed in middle aged and elderly groups.

Using the Canadian Guidelines for Healthy Weights (Department of National Health and Welfare, 1988a), about one in 4 participants, or **605,000** individuals in the population ages 18 to 74, had a weight which for height is associated with excess mortality and morbidity from a variety of chronic diseases (BMI equal to or greater than 27). This prevalence increases steadily with age.

About one in 4 individuals in the normal weight category (BMI under 25) was trying to lose weight. This was much more common among females in the three age groups. Among overweight individuals, that is those with BMI over 27, about two thirds were trying to lose weight. This was more common among females than among males (**Table 28**).



Overall, slightly more than one in 3 participants, or **778,000** individuals in the population ages 18 to 74, were trying to lose weight. Dieting was the most common method used to lose weight (82%) followed by exercise (69%). Use of diet pills for weight loss was minimal (1%) (**Table 29**).

Diabetes

Five percent of participants, or **108,000** individuals in the population ages 18 to 74, reported ever been told that they have diabetes. Among the 110 individuals in the sample who were aware, 21 reported having been diagnosed at age 30 or younger (**Table 30**).

Physical activity

About three quarters of the individuals exercised at least once per week. Among these, about two in 5 reported that the exercise was strenuous enough to cause sweating or exertional breathing and for 70% the duration of the exercise was in excess of 30 minutes. Females tended to exercise less strenuously than males and the length of their exercise period was of shorter duration (**Table 31**).

Combined risk factors for cardiovascular disease

Table 32 gives the percentage of the population with 0, 1, 2, or 3 of the major risk factors for cardiovascular disease: smoking, high blood pressure and elevated blood cholesterol. Fifty nine (59%) of participants or **1,275,000** British Columbians ages 18-74, had one or more of the major risk factors. This

prevalence of combined risk factors increased with age and was higher among males than among females in the middle aged group.

Seventeen (17%) of the participants, or **367,000** individuals in the population ages 18-74, had two or more of the major risk factors. This prevalence of combined risk factors increased substantially from the younger to the middle aged groups for both sexes. There was no appreciable difference in this prevalence between the sexes within the younger and middle aged groups. However, among older females the prevalence of multiple risk factors appeared to be higher than among elderly males.

Among individuals with elevated blood cholesterol (equal to or greater than 5.2 mmol/L (200 mg/dL)) the most prevalent risk cofactor in the younger and middle aged groups is smoking. Among the elderly with elevated blood cholesterol, high blood pressure becomes the more prevalent comorbid condition (**Table 33**).

Table 34 shows that, in males, higher education was associated with lower (age standardized) prevalence of: elevated blood cholesterol, high blood pressure and multiple risk factors. There was no clear trend on the association of educational level attained and the prevalence of smoking and overweight. Among females, higher education appeared to be associated with lower prevalence of: high blood pressure, smoking, overweight and multiple risk factors. With respect to elevated blood cholesterol the prevalence increased slightly with the level of education.

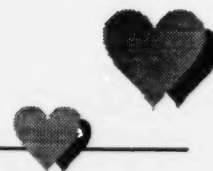
Table 35 shows the comparison of the prevalence (age standardized) for some risk factors among metropolitan, urban and rural areas. Among males, in the metropolitan and urban areas there

was higher prevalence than in the rural areas for: elevated blood cholesterol, high blood pressure and multiple risk factors. Metropolitan males had, by comparison a much lower prevalence of overweight than did either the urban or the rural males. Urban and rural females had higher prevalence than metropolitan females for overweight and smoking.

Information on awareness of the causal risk factors in the development of heart disease is given in **Table 36**. About one half of individuals recognized smoking, lack of exercise, poor diet and stress and overweight as risk factors for heart disease. About one in 3 identified high blood cholesterol, heredity and high blood pressure.



V. DISCUSSION OF RESULTS



Survey response

The overall location rate for individuals whose names were drawn from the Medical Services Plan File for Residents of British Columbia was less than anticipated. This may be explained, in part, by the fact that the File was not fully updated at the time of the survey. Some individuals had moved from their registered address. Others had died or left the province and may not have been deleted from the File. Since virtually all residents in the province are registered, every resident 18 to 74 years of age had some probability of selection under the sampling scheme used. The probability weights were not adjusted for double listings. This is not believed to have had an appreciable effect on the tabular estimates.

The overall response rate for the survey and the response patterns by age-sex groups compare favorably with those observed in national and international studies (Department of National Health and Welfare, 1973; Statistics Canada and Department of National Health and Welfare, 1981; Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989; The WHO-MONICA Project, 1988). This was largely due to the fact that the community health professionals who conducted the survey enjoyed a high degree of credibility and trust in the community.

To assess the extent to which non response may have influenced the

results, a comparison is made in **Table 37** of selected socio-demographic characteristics and health behaviours between clinic attendees and those individuals who participated in the home interview, but did not come to the clinic. This Table shows that those who did not attend the clinic were more likely to be regular cigarette smokers and fewer of them had post-secondary education. There were no appreciable differences between the two groups with respect to the prevalence of high blood pressure, sedentary lifestyle and level of income.

The difference observed between these two groups with respect to smoking prevalence and educational level, confirms a similar observation reported by the Nova Scotia Heart Health Survey (Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989). It is thus plausible that individuals who did not attend the clinic were more likely to have had cardiovascular disease risk factors. For this reason, the prevalence of risk factors reported here may, in fact, be an underestimate of the actual prevalence of risk factors in the population.

High blood pressure

In this survey, the presence of high blood pressure was defined as follows: (1) a diastolic blood pressure equal to or greater than 90 mm Hg (the mean of four measurements made at two separate visits) and/or (2) being on medication

and/or salt restriction and/or weight reduction for the treatment of high blood pressure.

It is worth pointing out that the British Columbia Heart Health Survey provides more reliable prevalence rates of high blood pressure than other surveys where blood pressure was measured at one visit only (Department of National Health and Welfare, 1973, 1989; Statistics Canada and Department of National Health and Welfare, 1981; Fitness and Amateur Sport Canada, 1983).

From a clinical perspective it is worth noting that a mildly elevated diastolic blood pressure reading, taken only on one or two occasions, does not necessarily imply that the individual would be labeled hypertensive or that drug treatment is indicated. However, longitudinal studies have shown that blood pressure measurement on only one occasion can predict the occurrence of high blood pressure (Rabkin et al., 1982; Robitaille et al., 1983), cardiovascular disease (The Pooling Project Research Group, 1978) and death from any cause (Johansen et al., 1987) years later.

Thus, the definition used in this report to define high blood pressure is judged to be appropriate to determine the health of the community in that it provides a measure of the increased cardiovascular disease risk due to elevated blood pressure (Blackburn et al., 1985; Nova Scotia Department of Health and Fitness, 1987; Department of National Health and Welfare, 1989; Health and Community Services New Brunswick, 1989).

The prevalence of high blood pressure was lower than that reported in two Heart Health Surveys in the Atlantic Provinces (Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick,

1989) and in the Canadian Blood Pressure Survey (Department of National Health and Welfare, 1989).

The prevalence of high blood pressure was higher in the older age group, where issues of compliance as well as the risks and benefits of treatment are still uncertain (Larochelle et al., 1986). Although the prevalence in the younger age group was much lower, it is worth noting that compliance with treatment is likely to be more of a challenge with this group.

It is of concern that among individuals with high blood pressure, 57% were not controlled and that one in 5 was unaware of his/her condition. This was so despite the fact that 69% of the participants reported having had their blood pressure checked within the year prior to the survey.

These findings suggest that the management and/or compliance with prescribed therapy is far from optimal. This is supported by the finding that, among individuals who were told that they had high blood pressure and were prescribed a treatment or program, an appreciable number of them were not following the treatment or program at the time of the survey.

Factors which may be associated with the lack of control of high blood pressure appear to be: the paucity of information given to patients concerning their blood pressure and the relative infrequent use of non-pharmacological approaches to management of the condition.



Lipids

According to recent scientific consensus conferences, the presence of high levels of total blood cholesterol and LDL-cholesterol, as well as a low HDL-cholesterol level are strongly related to the development of atherosclerosis in humans and therefore warrant remedial action (Canadian Consensus Conference on Cholesterol: Final Report, 1988; National Cholesterol Education Program 1988; European Atherosclerosis Society, 1987). The data from the British Columbia Heart Health Survey permit an assessment of the population risk in terms of these different plasma lipid fractions and their combinations.

The Canadian Consensus Conference on Cholesterol (1988) recommended as a goal a mean total blood cholesterol level of 4.9 mmol/L (190 mg/dL) in the general population. By this criterion, the data from the British Columbia Heart Health Survey indicate that, for middle age and older groups, a reduction of about 10% in the mean blood cholesterol level from current levels would apply.

The potential for prevention is indeed significant. Analyses of the results of ischemic heart disease primary prevention trials and observational studies involving many thousands of subjects, followed over a number of years provide concurrent evidence that significant reductions (10 to 30%) of ischemic heart disease events would be obtainable in Canada in the next decade with relatively modest reduction of the blood cholesterol of most adult Canadians (MacMahon and Peto, 1988; Tyroler, 1985, 1987). These estimates of the potential for reduction are above and beyond the current rates of decline. With further reductions in smoking cessation,

high blood pressure, obesity and sedentary lifestyle, the benefits should be much greater (Little and Horlick, 1989; Kotke et al., 1985).

LDL-cholesterol is recognized as the major atherogenic fraction (Grundy, 1986; Brown and Goldstein, 1986). However, for purposes of case-finding and initial evaluation in practical settings, analysis of total blood cholesterol is more readily available. The latter is a good proxy for risk since total blood cholesterol is closely correlated with LDL-cholesterol by virtue of the fact that about 70% of the cholesterol in the plasma is found in LDL-cholesterol.

There are an estimated **994,000** British Columbians who are at increased risk due to elevated plasma cholesterol (above 5.2 mmol/L (200 mg/dL)) who would benefit from having it reduced. Among these, **367,000** are at high risk [above 6.2 mmol/L (240 mg/dL)] and require some form of medical intervention.

The overall prevalence of elevated plasma cholesterol, LDL-cholesterol and low HDL-cholesterol over various levels of risk reported here, matches very closely that observed in two Atlantic Heart Health Surveys (MacLean and Petrasovits, 1988; Health and Community Services New Brunswick, 1989).

Clinical trials have shown that lowering LDL-cholesterol in men with high levels decreases the incidence of ischemic heart disease (Mishkel, 1989; Langille and Lavigne, 1988). In terms of this fraction, **778,000** individuals in British Columbia, ages 18 to 74, are above "desirable" levels [equal to or greater than 3.4 mmol/L (130 mg/dL)] and **324,000** are in the "high risk" LDL-cholesterol range [equal to or greater than 4.1 mmol/L (160 mg/dL)].

A low HDL-cholesterol concentration, defined as a level below 0.9 mmol/L (35 mg/dL) is associated with a significant increase in ischemic heart disease risk in both men and women (Gordon et al. 1977; Goldburt and Medalie, 1979; Grundy et al., 1989). By this criterion there are about **173,000** individuals in British Columbia at high risk due to low HDL-cholesterol. Hygienic means (e.g. smoking cessation, aerobic exercise, weight control) have been recommended to raise "low HDL-cholesterol" levels. Drug therapy specifically to raise HDL-cholesterol in patients without high blood cholesterol levels is not advocated at this point (Grundy et al., 1989).

The higher prevalence among middle age men of risk levels for total plasma cholesterol and the lipoprotein fractions LDL- and HDL-cholesterol, together with evidence of benefit from epidemiological intervention studies and recommendations from review panels, suggest that they would constitute a priority for intervention (National Cholesterol Education Program, 1988; Toronto Working Group on Cholesterol Policy, 1989; Logan, 1989).

The statistical cross-tabulations of prevalence for different lipid fractions (**Tables 17 and 18**) give an idea of the usefulness of measuring HDL- and LDL-cholesterol in those individuals for whom an elevated blood cholesterol value has been obtained. Note, for example that among individuals with a blood cholesterol over 6.2 mmol/L (240 mg/dL) 81% (13/16) had also a LDL-cholesterol in the "high risk" range [above 4.1 mmol/L (160 mg/dL)] and 12% (2/17) also had a low HDL-cholesterol [less than 0.9 mmol/L (35 mg/dL)]. Therefore, there appears to be little additional information gained by measuring LDL and HDL-cholesterol in these individuals (**Tables 17 and 18**).

By contrast, in the "moderate risk" range for blood cholesterol (between 5.2 and 6.2 mmol/L [200 mg/dL to 240 mg/dL]), 38% (11/29) of individuals had a normal LDL-cholesterol [less than 3.4 mmol/L (130 mg/dL)] and 93% (27/29) had HDL-cholesterol greater than 0.9 mmol/L (35 mg/dL). This suggests that, among these individuals, it is worth measuring LDL and HDL-cholesterol as a means of avoiding their entry into a treatment program (**Tables 17 and 18**). Note that when only total blood cholesterol is measured, individuals with elevated cholesterol falling in the "moderate risk" range might normally be subjected to dietary therapy and medical surveillance. This may be avoided in a good number of cases by ascertainment of the normalcy of the LDL- and HDL-cholesterol fractions.

Tables 17 and 18 also show that among individuals with a "normal" total plasma cholesterol level of less than 5.2 mmol/L (200 mg/dL), about 4% (2/55) had an above normal LDL-cholesterol [greater than or equal to 3.4 mmol/L (130 mg/dL)] and about 7% (4/54) had a high risk HDL-cholesterol [less than 0.9 mmol/L (35 mg/dL)]. This would indicate some benefit of measuring LDL-cholesterol and HDL-cholesterol in this group of individuals with normal total plasma cholesterol, particularly when other risk factors are present (**Tables 17 and 18**).

If the results of studies conducted in the United States are a guide to the Canadian situation, bringing about control of individuals at high risk from elevated blood cholesterol will require addressing the education needs of physicians as to the importance of elevated blood cholesterol as a risk factor, and the apparent lack of action to manage it at levels associated with moderate risk (Shucker et al., 1987a,

1987b). In Canada, surveys of physicians indicate that about 70% consider *hypercholesterolemia an important risk factor for ischemic heart disease* and that 50% to 70% routinely test for blood cholesterol, triglycerides and HDL-cholesterol (Reeder et al., 1989; Cooper Market Services Limited, 1989; Battista et al., 1989).

Most individuals are aware of the existence of cholesterol and that it may have an impact on health. However, specific knowledge of its link to diet and health is lacking. Diet is a case in point. While many factors influence the level of blood cholesterol, in most individuals with moderate to high elevations, diet is recognized as the most significant (Blackburn, 1979). This would suggest the need for public education programs which address directly the need to reduce total and saturated fat intake, as well as practical guidance for individuals on how to achieve this end.

The large numbers of individuals in British Columbia who are at "moderate" to "high risk" due to elevated blood cholesterol, parallels what has been reported in other Canadian jurisdictions (Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989) and in the United States (Sempos et al., 1989). There are concerns that identification of large numbers of individuals as being at risk, coupled with availability of new therapies and the lack of reliability of routine laboratory lipid measurements, could lead to overmedicalization and add to the health care costs without yielding significant benefit to the improvement of the health status of the population (Toronto Working Group on Cholesterol Policy, 1989; Logan, 1989). Care is needed to avoid the potential harmful consequences of labeling individuals at risk or causing undue anxiety through

inappropriate programs of public information or of detection of persons at *high risk* (Haynes et al., 1978; Wagner et al., 1984).

Undue medicalization may, in part, be averted through appropriate professional and patient education programs, cautious treatment guidelines for the use of drugs and by health professionals making more use, when appropriate, of non-pharmacological approaches as the sole or complementary means to control risk factors such as elevated blood pressure and high blood cholesterol (Canadian Consensus Conference on Non-Pharmacological Approaches to the Management of High Blood Pressure, 1989; Canadian Consensus Conference on Cholesterol, 1988; Little and Horlick, 1989).

In addressing the above concerns, it is important to keep in perspective that the identification of a large segment of the population as being at risk need not, per se, result in undue impact on health care costs, since for the majority of these individuals, little more would be required than reinforcing the hygienic, general population health promotion-type of approach focusing on appropriate lifestyle changes. (European Atherosclerosis Society, 1987).

Smoking

Due to its widespread prevalence, smoking makes a major contribution to cardiovascular disease mortality and morbidity as well as to other chronic diseases (e.g. lung cancer, chronic obstructive pulmonary disease).

The prevalence of regular cigarette smoking in the British Columbia Heart Health Survey matches closely the rates reported for British Columbia in the

National Survey of Smoking Habits of Canadians (**Table 24**).

Overall, the smoking rate in British Columbia is lower than the national average (Department of National Health and Welfare, 1988). It is of special significance to note the high prevalence of smoking among males and females in the younger age group. Among regular smokers it is also worth noting the high prevalence of heavy smoking among middle aged males. Clearly there is a need for effective programs to prevent smoking and to promote smoking cessation.

Alcohol

Alcohol is being increasingly recognized as a significant factor for high blood pressure, even at moderate levels of consumption (Beilin et al., 1987). Although the reliability of estimating alcohol consumption through interviews may be open to question, the data from this survey suggest that a sizeable proportion of individuals are consuming alcohol at a level that is not consistent with good cardiovascular health.

Weight

There is some controversy as to whether overweight is an independent risk factor for ischemic heart disease. However, its role in the expression of high blood pressure, diabetes, hypercholesterolemia and in the development of other chronic conditions, such as osteoarthritis, is well recognized (Bray, 1985; Roncari, 1983). There is evidence that overweight as a risk factor is more significant the earlier in life it occurs (Rabkin, 1977).

The prevalence of overweight in British Columbia is widespread, especially among middle age and older males and females. Clearly females are more conscious about weight control than males. It is of particular concern that, among young and middle age females, who were of normal weight, over 30% were trying to lose weight. Males are less concerned with weight control as evidenced by the fact that only about one half of those who were frankly overweight were trying to control their weight. This suggests the need to make the public aware of what constitutes a healthy weight without creating undue anxiety (Department of National Health and Welfare, 1988b).

With respect to measures currently used to lose weight, it is advisable for education programs to emphasize appropriate dietary habits (e.g. not skipping meals) and the value of exercise. Weight control programs do not seem to be utilized to any great extent. This suggests the possibility of exploring opportunities for self-help and mutual aid groups to assist individuals to understand what a healthy weight is and how to obtain it.

Diabetes

Diabetes is recognized as an independent risk factor for heart disease and is especially significant for women after middle age (Kannel and McGee, 1979; Kannel, 1985). The prevalence of awareness of this condition in this survey is identical to that reported in the New Brunswick Heart Health Survey (Health and Community Services New Brunswick, 1989) and is similar to that reported by the Canada Health Survey (Statistics Canada and Department of

National Health and Welfare, 1981). It is believed that there is a sizeable group of diabetics who are not aware of their condition (Wigle, 1986). The prevalence of diabetes reported here is most likely an underestimate of the true prevalence.

The small number of individuals in the sample who were aware of their diabetic status does not lend itself to a breakdown by age and gender. Since the prevalence of diabetes is known to increase with age, it can be presumed that awareness and control programs targeting the middle age and older age groups should be a priority.

Physical activity

There is evidence that vigorous physical activity is a preventive factor for heart disease (Paffenbarger et al., 1978). Exercise helps to control other risk factors (e.g. weight) and it can be beneficial for overall health. The interview instrument used in this survey did not allow the estimation of the percentage of individuals who exercise vigorously, that is, in a manner that would benefit their cardiovascular health. Nevertheless, the data provide a valid estimate of the proportion of the population which is sedentary and that would benefit from appropriate health promotion activities.

Relative to Canada as a whole and to some Atlantic Provinces a large segment of the British Columbia population leads an active lifestyle. (Stephens et al., 1986; Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989). Nonetheless there should be room for improvement among those who are active. Programs to reach those in the population who are not currently active should be considered.

Combined risk factors

It is well recognized that significant elevation of any one of the major cardiovascular disease risk factors can pose a risk to health. For example, the risk of death due to ischemic heart disease within a seven year period, for middle age men with a plasma cholesterol of 6.2 mmol/L (240 mg/dL), is doubled, in comparison to the risk for middle age men with plasma cholesterol of 5.2 mmol/L (200 mg/dL). However, it is less well appreciated that combined and moderate elevations of several risk factors may also confer a significant increase of ischemic heart disease risk. For example, cigarette smoking about doubles the risk of heart disease at all levels of plasma cholesterol (Stamler, 1986). Data from this survey suggest that many British Columbians who have elevated blood cholesterol as well as other risk factors (smoking, high blood pressure) would benefit from an integrated, multifactorial approach to managing their cholesterol problem.

In British Columbia, it is estimated that 1,275,000 individuals have one or more of the major cardiovascular disease risk factors. This is generally consistent with the estimates obtained in other risk factor surveys where the combined prevalence of risk factors was calculated (Department of National Health and Welfare, 1988). It is worth noting, however, that the combined risk factor prevalence in British Columbia is lower than that reported in two Atlantic Heart Health Surveys (Nova Scotia Department of Health and Fitness, 1987; Health and Community Services New Brunswick, 1989).

Socio-economic and regional differences

In Canada, the inverse relationship between income and cardiovascular mortality (Wigle, Mao, 1980) and education and risk factor prevalence (Millar, Wigle, 1986) has previously been reported. In so far as the level of education may be considered a proxy for socio-economic status, the results of the British Columbia Heart Health Survey indicate the importance of the latter as a determinant of cardiovascular disease risk. This is particularly the case for young men and women with lower levels of education with respect to most of the risk factors considered here. This argues for the need to target appropriate policies and programs to these groups if the health of the population is to be improved.

While there were some differences in the prevalence of risk factors among the metropolitan, urban and rural areas, the prevalence is uniformly high. This suggests that all regions of the Province would benefit from heart health programs, which should be designed so as to serve the specific needs of the different areas.

These findings clearly indicate that cardiovascular disease risk is widespread in the population. The survey data also point to important gaps in public knowledge and awareness. Thus, these results would suggest that a multifactorial, integrated health promotion approach is required.



VI. CONCLUSIONS



The data from the British Columbia Heart Health Survey raise a wide range of issues that need to be addressed. While it is recognized that a relatively small fraction of individuals are at risk because of genetic or familial conditions beyond their control, the widespread prevalence of risk factors strongly suggests that the high rate of cardiovascular disease in the province is due, by and large, to unhealthy lifestyle characteristics.

A public health approach to deal with prevention of cardiovascular disease is required. This approach should be three pronged in that it should address: the population at large, those at high risk and those disadvantaged groups in whom risk factors are known to cluster.

Targeting the population at large is seen as the cornerstone strategy for an integrated approach to prevention of cardiovascular disease addressing all of the modifiable risk factors, namely smoking, high blood pressure, diabetes, elevated cholesterol, obesity and lack of physical activity. There is an additional requirement to detect and provide medical intervention for the smaller proportion of the population that are at high risk and to develop innovative programs which address inequalities in heart health.

Implementation of the population approach at the community level presents an opportunity for health departments to begin to develop community-based heart health programs. This requires the building of partnerships and coalitions at the

community level that will include among others the health department, health professionals, voluntary agencies such as the Heart Foundation, schools, the business sector and the public, particularly representatives of those disadvantaged groups that require specific attention. The Heart Health initiative has the potential to contribute significantly to the Healthy Communities initiative by serving as a mechanism for interesting and involving many of the health professionals of the community in a multidisciplinary fashion in the resolution of community problems.

Program activity at the community level needs to be supported by a wide range of policies designed to create healthy environments and environments which support positive lifestyle choices.

The survey data show that about two in 3 individuals in British Columbia have one or more major risk factors for ischemic heart disease (smoking, high blood pressure, elevated blood cholesterol). With respect to smoking, British Columbia has lower smoking rates than the other Canadian provinces. However, the fact that over one in 4 young adults smoke and only one half of all individuals surveyed are aware that smoking is a cause of heart disease would suggest that renewed efforts are warranted to sensitize British Columbians to the importance of being smoke free. This must be accompanied by policies and regulations which will create an environment supportive of non-smoking.

The high percentage of individuals with high blood pressure who do not have their blood pressure under control, or are not aware of their condition or of its causes and consequences suggest the need for health education strategies which will complement improved clinical management.

The potential impact on health care costs of providing medical interventions to the large number of individuals with elevated blood cholesterol levels should stimulate the development of effective population approaches. The goal of these should be to reduce blood cholesterol levels of most British Columbians in a context that addresses other cardiovascular risk factors.

The implementation of a comprehensive public health approach to address the cholesterol issue in British Columbia and indeed in Canada requires a proper time horizon. This is important in order to ensure that the appropriate development of the different components which are needed goes hand in hand with the available resources. Priorities need to be set in the context of a policy to address all the different aspects of the cholesterol issue which are interlinked. There is a plethora of identification, evaluation and treatment guidelines. This is creating confusion among health professionals; practical, national guidelines are indicated. Other necessary components are: implementation of an intersectoral approach to bring together the numerous stakeholders involved in the cholesterol issue; promotion and support of enhanced reliability of laboratory analysis of blood lipids which would make identification and evaluation more efficient; professional education and provision of necessary manpower resources to optimize the effectiveness of the management of hypercholesterolemia and the avoidance of unnecessary

medicalization; public education and promotion of dietary change to empower consumers with information that will support and bring about dietary practices and that will reduce the average blood cholesterol level of British Columbian adults; and the setting in place of programs for identification and appropriate management of hard-to-reach groups and individuals at high risk with due concern for equity in the distribution of health care resources.

Of paramount importance is the need to implement, through an effective dietary strategy, the recently released Nutrition Recommendations for Canadians (Department of National Health and Welfare, 1990a, 1990b). Such an strategy should be sensitive to the cultural diversity of British Columbia and be coordinated with other health education approaches which promote healthy weight and increased physical activity among the citizens of this Province. Such an approach would simultaneously mitigate the factors that underlie or are associated with the high prevalence of high blood pressure or elevated cholesterol.

Judicious planning, implementation and evaluation of programs to address these dietary issues, requires a valid data base on the nutritional practices and status of the population. The Nutrition Canada Survey was carried out in 1972. There is a need for current data. Some provincial jurisdictions are planning nutrition surveys starting in 1990 (MacLean, 1989; Lessard, 1989; Beare-Rogers, 1989; Stachenko, 1989).

Many residents of the province are at high enough risk for one or more major risk factors and would benefit from medical intervention. The data presented here indicate that there is a potential for improving the identification and the



management of individuals at moderate to high risk. This is the case with respect to the large number of individuals with uncontrolled high blood pressure, highly elevated blood cholesterol or with multiple risk factors. There is an opportunity for increased use of non-pharmacological approaches to the management of individuals at risk.

There is a need for an organized, systematic approach to enhance the preventive practices of health professionals. This would include cooperative, interdisciplinary programs to enable prevention through primary care physicians, as well as approaches to link the primary care sector with the public health system and community health promotion initiatives.

The data from the British Columbia Heart Health Survey may be used to further characterize groups at risk and determine cost-effective approaches of alternative interventions.

It is clear that comprehensive public health measures are required to implement the above strategies. Emphasis on intersectoral coordination and coalition building between government, professional associations, community health agencies, business and industry and researchers is of the essence to bring about healthy policies and environmental change necessary to deal with the underlying roots of cardiovascular disease in this province.



HEART
HEALTH

VII. TABLES

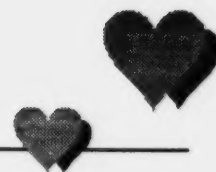


TABLE 1:

DATA GATHERED AT THE HOME INTERVIEW
AND AT THE CLINIC VISIT

I HOME INTERVIEW

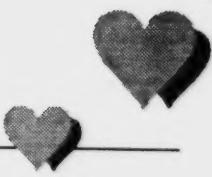
- A. Individual and household demographic data
- B. Knowledge and awareness of:
 - 1. High blood pressure
 - 2. Cholesterol
 - 3. Dietary factors (fat, salt)
 - 4. Heart disease and stroke
- C. Health Behaviours:
 - 1. Smoking
 - 2. Alcohol consumption
 - 3. Physical activity
 - 4. Compliance with prescribed treatment for high blood pressure and elevated blood cholesterol
- D. Two blood pressure measurements
- E. Dietary questionnaire

II CLINIC VISIT

- A. Two blood pressure measurements
- B. Height and weight
- C. Fasting blood sample.

TABLE 2:

NUMBER IN THE POPULATION, SAMPLE DRAWN
FROM FILE AND RESPONSE BY AGE AND SEX



	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Number in population ^(a)	414400	548300	107900	416600	542700	130900	2160800
Number drawn from file ^(b)	1594	676	389	1494	649	402	5204
Number located ^(c)	809	400	274	794	421	271	2969
Home interview completed							
No.	647	318	219	663	343	213	2403
% ^(d)	80	80	80	84	81	79	81
Home interview and clinic visit completed							
No.	532	282	203	556	313	183	2069
% ^(e)	66	71	74	70	74	68	70

- (a) Postcensal annual estimates of population June 1, 1989. Statistics Canada
 (b) Total number of names drawn from the BC MSP data files (March 17, 1989).
 (c) Total number of individuals who were located using information from the BC MSP data files and were invited to participate in the BCHHS.
 (d) Percentage who completed the home interview among those located.
 (e) Percentage who completed the home interview and clinic among those located.



TABLE 3:
NUMBER DRAWN, LOCATED AND
RESPONSE BY AREA

	Drawn	Located	Home Interview Completed		Home Interview & Clinic Visit Completed	
	Number	Number	Number	%	Number	%
<u>Stratum I</u>						
Vancouver Metropolitan	1511	772	597	77	466	60
Victoria Metropolitan	725	384	299	78	262	68
<u>Stratum II</u>						
Kelowna	372	233	156	67	134	58
Prince George	265	178	160	90	136	76
Chilliwack	235	142	111	78	105	74
Matsqui	173	143	125	87	116	81
<u>Stratum III</u>						
Williams Lake	139	89	77	87	64	72
Campbell River	301	155	134	86	121	78
Squamish	214	117	92	79	88	75
East Kootenay (A,B,C)	109	62	55	89	50	81
<u>Stratum IV</u>						
Bulkley-Nechako (A)	59	39	39	100	34	87
Bulkley-Nechako (B,C)	23	15	15	100	11	73
Mackenzie	273	155	127	82	101	65
Kootenay (A,B)	119	89	77	87	75	84
<u>Stratum V</u>						
100 Mile House	244	136	113	83	97	71
Creston	169	120	104	87	98	82
Valemount	50	36	33	92	31	86
North Okanagan (A)	10	8	7	88	7	88
<u>Stratum VI</u>						
Tofino	102	25	23	92	19	76
Belcarra	26	19	18	95	18	95
New Hazelton	53	35	27	77	24	69
Port Edward	32	18	14	78	12	67
Total	5204	2969	2403	81	2069	70

TABLE 4:

SOCIODEMOGRAPHIC CHARACTERISTICS OF PARTICIPANTS
IN THE HOME INTERVIEW^(a)



	Percent %
Education: (b)(c)	
Elementary	4
Secondary	52
Post Secondary	<u>44</u>
Total	100

Employment Status: ^(d)	
Full time	50
Part time	12
Unemployed/laid off	5
Retired	13
Homemaker	13
Student	3
Other	<u>3</u>
Total	100

(a) Weighted data.

(b) Total number in the sample: 2398.

(c) Education: Elementary = grades 0-7
 Secondary = grades 8-12
 Post secondary = grades >12.

(d) Total number in the sample: 2391.



TABLE 5:

MEAN VALUES OF BLOOD PRESSURE^(a) AND PREVALENCE
OF HIGH BLOOD PRESSURE^(b) BY AGE AND SEX^(c)

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Systolic B.P. ^(a) Mean (mmHg)	120	128	140	111	120	139	-
Diastolic B.P. Mean (mmHg)	75	82	80	69	76	77	-
Prevalence of HBP	6	23	28	3	15	30	14

- (a) Based on the mean of two or more blood pressure (B.P.) measurements obtained at either the home or clinic visit (Total in sample = 2396).
- (b) High Blood Pressure (HBP) is defined as diastolic B.P. ≥ 90 mmHg and/or on treatment (pharmacological or non-pharmacological: weight control and/or salt restriction).
- (c) Weighted data.

TABLE 6:

PREVALENCE OF HIGH BLOOD PRESSURE
AWARENESS, TREATMENT AND CONTROL STATUS^(a)
(ALL AGE AND SEX GROUPS COMBINED)^(g)



Status	Prevalence %
Aware	
Treated and controlled ^(b)	43
Treated and not controlled ^(c)	14
Not treated and not controlled ^(d)	20
Not aware ^(e)	<u>23</u>
Total ^(f)	<u>100</u>

- (a) The group of individuals distributed across the categories in the table have either been told that they have HBP or were found to have HBP (DPB 90 mmHg) on measurement; excluded are those who were told that they had HBP but were not on treatment and had DBP <90 mmHg.
- (b) Individuals who were told that they had HBP and were treated and have DBP <90 mmHg.
- (c) Ditto as (b) with DBP $\geq$ 90 mmHg.
- (d) Individuals who were told that they had HBP and were not treated and have DBP $\geq$ 90 mmHg.
- (e) Individuals who were never told they had HBP and have DBP $\geq$ 90 mmHg.
- (f) Total number in the sample: 313.
- (g) Weighted data.

TABLE 7:

PERCENT RESPONSES TO QUESTIONS ON BLOOD
PRESSURE MEASUREMENT BY AGE AND SEX^(a)



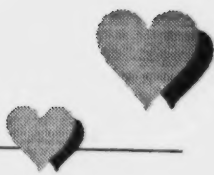
	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Ever had B.P. Checked	91	99	99	97	99	99	97
Had B.P. checked within last year ^(b)	56	66	81	75	71	82	69
B.P. was checked ^(b)							
by doctor	74	76	84	78	87	80	79
by nurse	18	18	12	19	11	17	16
B.P. measurement described by numbers	9	9	12	9	11	11	10

(a) Weighted data.

(b) Among those individuals who reported having their B.P. ever checked.
Total number in the sample: 2318.

TABLE 8:

PERCENT RESPONSES TO QUESTIONS ON
TREATMENT FOR HIGH BLOOD PRESSURE
(ALL AGE AND SEX GROUPS COMBINED)^(a)



	Percent %
Ever told by health professional that they have HBP	22
Any treatment or program prescribed ^(b)	65
Currently not following a treatment or program ^(c)	31
Currently taking drugs ^(c)	44

(a) Weighted data.

(b) Among those individuals who were ever told that they have HBP.
Total number in the sample: 516.

(c) Among those individuals who were told that they had HBP and for whom
something was prescribed. Total number in the sample: 348.

TABLE 9:

SPECIFIC ADVICE GIVEN TO THOSE
WITH HIGH BLOOD PRESSURE FOR WHOM
TREATMENT OR PROGRAM WAS PRESCRIBED^{(a)(b)(c)(d)}
(ALL AGE AND SEX GROUPS COMBINED)

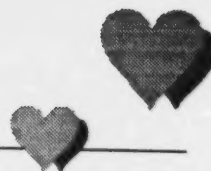


Advice	Percent %
Take drugs only	37
Drugs and other treatment	29
Watch weight	26
Salt free diet	23
Start exercise program	13
Avoid stress	12
Cut down on alcohol	5

- (a) Total number in the sample: 348.
(b) Excluding responses 'to cut down or stop smoking' and the residual category 'other'.
(c) Unprompted responses, more than one response allowed.
(d) Weighted data.

TABLE 10:

PERCENT AWARE OF DIETARY FACTORS
RELATED TO HIGH BLOOD PRESSURE^{(a)(b)}
(ALL AGE AND SEX GROUPS COMBINED)^(c)



Advice	Percent %
Alcohol	60
Fats	49
Salt/salty foods	46
Cholesterol	27
Fried foods	24
Sugar/sweet foods	23
Coffee/caffeine	21
Saturated Fats	13
Meats generally	9
Pork	6
Eating too much	6
Sodium	6
Specific meat other than pork	2

- (a) Among those who said that HBP is related to what people eat or drink.
Total number in the sample: 2157.
- (b) Unprompted responses, more than one response allowed.
- (c) Weighted data.



TABLE 11:

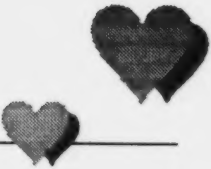
MEAN VALUES FOR PLASMA CHOLESTEROL AND
HDL CHOLESTEROL BY AGE AND SEX^{(a)(b)}

		Male			Female		
		18-34	35-64	65-74	18-34	35-64	65-74
Plasma Cholesterol							
Mean	mmol/L	4.7	5.5	5.5	4.6	5.4	6.1
	[mg/dL]	[180]	[213]	[214]	[179]	[208]	[235]
Number in the sample		(493)	(262)	(180)	(509)	(288)	(162)
HDL - Cholesterol							
Mean	mmol/L	1.2	1.3	1.2	1.4	1.5	1.5
	[mg/dL]	[47]	[49]	[47]	[55]	[57]	[57]
Number in the sample		(490)	(261)	(180)	(508)	(287)	(162)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

(b) Weighted data.

TABLE 12:

MEAN VALUES FOR LDL CHOLESTEROL AND
TRIGLYCERIDES BY AGE AND SEX^{(a)(b)}


		Male			Female		
		18-34	35-64	65-74	18-34	35-64	65-74
LDL - Cholesterol							
Mean	mmol/L	2.8	3.4	3.5	2.6	3.2	3.7
	[mg/dL]	[108]	[133]	[136]	[102]	[123]	[143]
Number in the sample		(487)	(252)	(177)	(507)	(282)	(157)
Triglycerides							
Mean	mmol/L	1.4	1.8	1.7	1.1	1.4	1.9
	[mg/dL]	[120]	[155]	[152]	[99]	[126]	[168]
Number in the sample		(493)	(262)	(180)	(509)	(288)	(162)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

(b) Weighted data.



TABLE 13:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a) BY
PLASMA CHOLESTEROL LEVELS BY AGE AND SEX^(b)

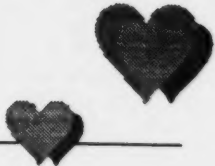
	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<5.2 mmol/L (<200 mg/dL)	75	39	35	79	46	21	54
≥5.2-6.2 mmol/L (≥200-239 mg/dL)	19	38	42	17	34	37	29
≥6.2 mmol/L (≥240 mg/dL) by doctor	<u>6</u>	<u>23</u>	<u>23</u>	<u>4</u>	<u>20</u>	<u>42</u>	<u>17</u>
Total	100	100	100	100	100	100	100
Number in the sample	(493)	(262)	(180)	(509)	(288)	(162)	(1894)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

(b) Weighted data.

TABLE 14:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a)
BY LDL CHOLESTEROL LEVELS BY AGE AND SEX^(b)



	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<3.4 mmol/L (<130 mg/dL)	77	47	46	87	61	40	64
≥3.4-4.1 mmol/L (≥130-159 mg/dL)	16	30	30	10	22	25	21
≥4.1-4.9 mmol/L (≥160-189 mg/dL)	5	15	21	2	12	19	10
≥4.9 mmol/L (≥190 mg/dL)	<u>2</u>	<u>8</u>	<u>4</u>	<u>1</u>	<u>5</u>	<u>17</u>	<u>5</u>
Total	100	100	100	100	100	100	100
Number in the sample	(487)	(252)	(177)	(507)	(282)	(157)	(1862)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

(b) Weighted data.

TABLE 15:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a) BY HDL
CHOLESTEROL LEVELS BY AGE AND SEX^(b)

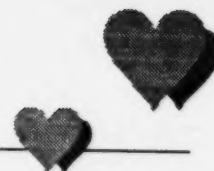
	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
<0.9 mmol/L (<35 mg/dL)	12	12	15	3	3	6	8
≥0.9 mmol/L (≥35 mg/dL)	<u>88</u>	<u>88</u>	<u>85</u>	<u>97</u>	<u>97</u>	<u>94</u>	<u>92</u>
Total	100	100	100	100	100	100	100
Number in the sample	(490)	(261)	(180)	(508)	(287)	(162)	(1888)

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more.

(b) Weighted data.

TABLE 16:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a) BY
HDL CHOLESTEROL AND LDL CHOLESTEROL LEVELS
(ALL AGE AND SEX GROUPS COMBINED)^(b)



LDL Cholesterol	HDL Cholesterol		Total
	<0.9 mmol/L (<35 mg/dL)	≥0.9 mmol/L (≥35 mg/dL)	
<3.4 mmol/L (<130 mg/dL)	5	59	64
≥3.4-4.1 mmol/L (≥130-159 mg/dL)	1	20	21
≥4.1-4.9 mmol/L (≥160-189 mg/dL)	1	9	10
≥4.9 mmol/L (≥190 mg/dL)	0	5	5
Total	7	93	100

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more. Total number in the sample: 1834.

(b) Weighted data.



TABLE 17:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a) BY
PLASMA CHOLESTEROL AND LDL CHOLESTEROL LEVELS
(ALL AGE AND SEX GROUPS COMBINED)^(b)

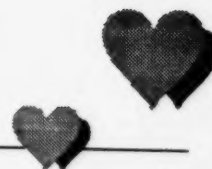
	Plasma Cholesterol			Total
	<5.2 mmol/L (<200 mg/dL)	5.2-6.2 mmol/L (≥200-239 mg/dL)	≥6.2 mmol/L (≥240 mg/dL)	
LDL Cholesterol				
<3.4 mmol/L (<130 mg/dL)	53	11	0	64
≥3.4-4.1 mmol/L (≥130-159 mg/dL)	2	16	3	21
≥4.1-4.9 mmol/L (≥160-189 mg/dL)	0	2	8	10
≥4.9 mmol/L (≥190 mg/dL)	0	0	5	5
Total	55	29	16	100

(a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more. Total number in the sample: 1862.

(b) Weighted data.

TABLE 18:

PERCENT DISTRIBUTION OF INDIVIDUALS^(a) BY PLASMA
CHOLESTEROL AND HDL CHOLESTEROL LEVELS
(ALL AGE AND SEX GROUPS COMBINED)^(b)



	Plasma Cholesterol			Total
	<5.2 mmol/L (<200 mg/dL)	≥5.2-6.2 mmol/L (≥200-239 mg/dL)	≥6.2 mmol/L (≥240 mg/dL)	
HDL Cholesterol				
<0.9 mmol/L (<35 mg/dL)	4	2	2	8
≥0.9 mmol/L (≥35 mg/dL)	50	27	15	92
Total	54	29	17	100

- (a) Based on the number of participants who attended the survey clinic, gave blood and fasted 8 hours or more. Total number in the sample: 1888.
- (b) Weighted data.



TABLE 19:

PERCENT RESPONSES TO QUESTIONS
ON CHOLESTEROL MEASUREMENT
(ALL AGE AND SEX GROUPS COMBINED)^(a)



	Percent %
Ever heard about cholesterol	97
Ever had blood cholesterol measured ^(b)	36
Was told what blood cholesterol level was ^(c)	62
Ever told by health professional that blood cholesterol was high ^(b)	13
Any treatment prescribed or advice given ^(d)	75
On diet to lower blood cholesterol ^(d)	43

(a) Weighted data.

(b) Among those reporting having heard about cholesterol.
Total number in the sample: 2315.

(c) Among those who reported having had blood cholesterol measured.
Total number in the sample: 714.

(d) Among those who were ever told that blood cholesterol was elevated.
Total Number in the sample: 250.



TABLE 20:

PERCENT AWARE OF FACTORS RELATED TO CHOLESTEROL
IN FOODS (ALL AGE AND SEX GROUPS COMBINED)(a)

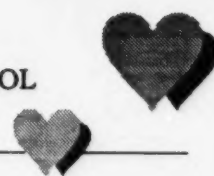
Factor	Percent %
Cholesterol is found in foods ^(b)	96
Cholesterol in foods affects health ^(c)	99
Cholesterol is found in: ^(d)	
Eggs	66
Whole Milk	50
Cheese	44
Beef	37
Pork	34
Poultry	19
Seafood	13

- (a) Weighted data.
- (b) Among those reporting having heard about cholesterol.
Total number in the sample: 2226.
- (c) Among those who think cholesterol is found in food.
Total number in the sample: 2158.
- (d) Unprompted responses, more than one response allowed.



TABLE 21:

PERCENT AWARE OF FACTORS RELATED TO CHOLESTEROL
IN BLOOD (ALL AGE AND SEX GROUPS COMBINED)(a)



Factor	Percent %
Cholesterol is found in blood ^(b)	90
Blood cholesterol affects health ^(c)	99
Blood cholesterol affects health by: ^(d)	
Hardening the arteries	73
Heart attack	52
Increasing blood pressure	28
Stroke	21

(a) Weighted data.

(b) Among those reporting having heard about cholesterol.
Total number in the sample: 2312.

(c) Among those who think cholesterol is found in blood.
Total number in the sample: 2074.

(d) Unprompted responses, more than one response allowed.

TABLE 22:

PERCENT RESPONSES TO QUESTION: "WHAT CAN A
PERSON DO TO LOWER HIS/HER BLOOD CHOLESTEROL
LEVEL"^{(a)(b)} (ALL AGE AND SEX GROUPS COMBINED)^(c)

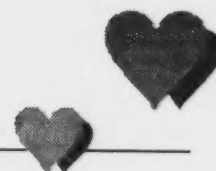


Response	Percent %
Eat foods with less cholesterol	71
Eat less fatty foods	52
Exercise regularly	50
Use low fat dairy products	22
Lose weight	12
Take prescribed medication	7
Control stress and fatigue	6

- (a) Among those reporting having heard about cholesterol.
Total number in the sample: 2307.
- (b) Unprompted responses, more than one response allowed.
- (c) Weighted data.

TABLE 23:

PERCENT AWARE OF HEALTH PROBLEMS
RELATED TO FAT CONSUMPTION
(ALL AGE AND SEX GROUPS COMBINED)(a)



Problem	Percent %
Fat consumption affects health	93
Health problems related to fat consumption ^{(b),(c)}	
Overweight	52
Heart disease	50
Elevated blood cholesterol	47
Hardening of the arteries	33
High blood pressure	27

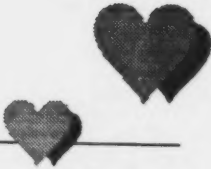
(a) Weighted data.

(b) Among those who reported that fat consumption affects health.
Total number in the sample: 2209.

(c) Unprompted responses, more than one response allowed.



TABLE 24:

PREVALENCE OF REGULAR CIGARETTE
SMOKING^(a) BY AGE AND SEX^(b)

	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Prevalence	28	25	13	30	24	12	25
Survey of smoking habits 1986 ^(c)	26	27	14	25	20	9	23

(a) Regular cigarette smoking is defined as smoking at least one cigarette per day, every day.

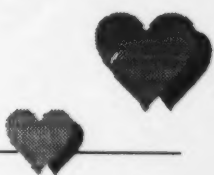
(b) Weighted data.

(c) Smoking Behaviour of Canadians (in B.C.), 1986. Department of National Health and Welfare, Ottawa 1988 (Cat. No. H39-66/1988E).



TABLE 25:

PERCENT DISTRIBUTION OF NUMBER OF CIGARETTES
SMOKED PER DAY AMONG REGULAR CIGARETTE
SMOKERS BY AGE AND SEX

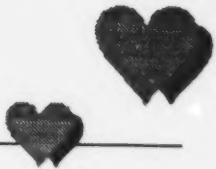


	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
1-10 Cigarettes/day	16	18	24	23	28	31	20
11-25 Cigarettes/day	73	50	73	66	60	50	65
26+ Cigarettes/day	<u>11</u>	<u>32</u>	<u>3</u>	<u>11</u>	<u>12</u>	<u>19</u>	<u>15</u>
Total	100	100	100	100	100	100	100
Number in the sample	(185)	(79)	(36)	(216)	(78)	(30)	(624)

(a) Weighted data.



TABLE 26:

PERCENT DISTRIBUTION OF ALCOHOL
CONSUMPTION BY AGE AND SEX^(a)


	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
No alcohol in last year	10	17	20	16	19	30	17
<7 drinks/week	59	52	50	75	70	51	63
≥7-20 drinks/week	24	22	22	8	9	19	16
≥20 drinks/week	<u>7</u>	<u>9</u>	<u>8</u>	<u>1</u>	<u>2</u>	<u><1</u>	<u>5</u>
Total	100	100	100	100	100	100	100
Number in the sample	(646)	(315)	(217)	(660)	(341)	(209)	(2388)

(a) Weighted data.



TABLE 27:

BODY MASS INDEX^(a): MEAN VALUES AND
PERCENT DISTRIBUTION BY AGE AND SEX^(b)

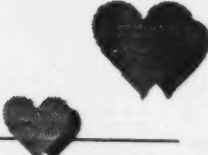
	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
BMI Mean	24.7	26.6	26.5	23.8	25.5	26.4	25.4
Percent distribution of BMI:							
<20	6	3	2	18	10	13	9
≥20-25	53	37	32	55	48	34	46
≥25-27	19	25	22	10	14	15	17
>27	<u>22</u>	<u>35</u>	<u>44</u>	<u>17</u>	<u>28</u>	<u>38</u>	<u>28</u>
Total	100	100	100	100	100	100	100
Number in the sample	(525)	(275)	(200)	(548)	(307)	(180)	(2035)

(a) BMI = Weight (kg)/height² (m) - calculated from clinic measurements.

(b) Weighted data.

TABLE 28:

NUMBER OF PERCENTAGE OF INDIVIDUALS TRYING TO
LOSE WEIGHT BY LEVEL OF BMI BY AGE AND SEX^(a)



		Male			Female			Total
		18-34	35-64	65-74	18-34	35-64	65-74	
BMI ^(b)								
<25	%	9	11	7	37	29	30	23
Number in the sample		(296)	(97)	(66)	(388)	(168)	(83)	(1098)
≥25-27	%	25	39	15	66	63	49	43
Number in the sample		(100)	(66)	(43)	(51)	(37)	(23)	(320)
≥27	%	48	56	52	74	69	65	61
Number in the sample		(128)	(112)	(91)	(108)	(102)	(72)	(613)

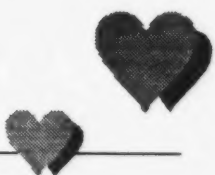
(a) Weighted data.

(b) BMI = Weight (kg)/height² (m) - calculated from clinic measurements.



TABLE 29:

PERCENT RESPONSES TO QUESTIONS RELATED TO
TRYING TO LOSE WEIGHT BY AGE AND SEX^(a)



	18-34	Male 35-64	65-74	18-34	Female 35-64	65-74	Total
Presently trying to lose weight	21	34	29	44	43	46	36
Trying to lose weight by ^(b) :(c)							
Dieting	69	80	83	80	87	88	82
Exercise	69	66	65	82	65	50	69
Skipping meals	18	16	9	22	15	7	16
Weight control programs	0	2	4	10	17	8	8
Diet pills	0	0	0	<1	<1	<1	1
Number in the sample	(137)	(106)	(61)	(296)	(153)	(93)	(846)

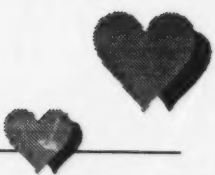
(a) Weighted data.

(b) Among those trying to lose weight.

(c) Unprompted responses, more than one response allowed.

TABLE 30:

PREVALENCE OF AWARENESS^(a) OF DIABETES
ALL AGE AND SEX GROUPS COMBINED^(b)

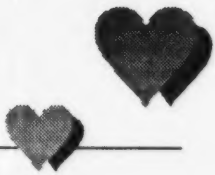


	Percent %
Percent Aware ^(c)	5

- (a) Awareness is defined as ever being told that you have diabetes.
- (b) Weighted data.
- (c) Among the participants who were aware, 21 (19%) were diagnosed at age <30 years, 72 (65%) at age >30 years and 17 (16%) were unsure of age at diagnosis.



TABLE 31:
PERCENT ENGAGING IN
PHYSICAL ACTIVITY BY AGE AND SEX^(a)



	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
Exercise regularly (at least once per week)	75	64	81	77	69	67	71
Most of the exercise is strenuous ^{(b),(c)}	67	41	31	42	38	13	43
Length of exercise session is over 30 minutes ^(b)	80	64	71	68	69	64	70

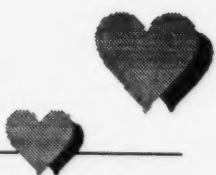
(a) Weighted data.

(b) Among those who reported exercising regularly.
Total Number in the sample: 1774.

(c) "Strenuous" is defined as enough exercise to cause
sweating or shortness of breath.

TABLE 32:

PERCENT DISTRIBUTION OF INDIVIDUALS WITH
0, 1, 2, 3 MAJOR RISK FACTORS^(a) BY AGE AND SEX^(b)



	Male			Female			Total
	18-34	35-64	65-74	18-34	35-64	65-74	
0 Risk factors	54	27	23	58	38	25	41
1 Risk factor	37	50	57	34	38	48	42
2 Risk factors	9	20	19	7	23	26	16
3 Risk factors	<u><1</u>	<u>3</u>	<u>1</u>	<u><1</u>	<u>1</u>	<u>1</u>	<u>1</u>
Total	100	100	100	100	100	100	100
Number in the sample	(644)	(316)	(219)	(662)	(343)	(212)	(2396)

- (a) Risk factors defined as follows:
Elevated plasma cholesterol >5.2 mmol/L(200 mg/dl).
High blood pressure: DBP $\geq$ 90 mmHg and/or on treatment.
Regular cigarette smoking.

- (b) Weighted data.

TABLE 33:

PREVALENCE OF SMOKING^(a) AND HIGH BLOOD
PRESSURE^(b) AMONG INDIVIDUALS WITH ELEVATED
BLOOD CHOLESTEROL^(c) BY AGE AND SEX



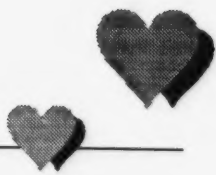
	Male			Female		
	18-34	35-64	65-74	18-34	35-64	65-74
Smoking only	30	25	13	30	24	13
High blood pressure	11	15	21	5	19	29
Smoking and high blood pressure	4	7	3	0	4	3
Total number in sample	(140)	(165)	(122)	(106)	(153)	(130)

(a) Regular Cigarette smoking.

(b) Diastolic blood pressure ≥ 90 mm Hg and/or treatment.

(c) Blood cholesterol ≥ 5.2 mmol/L (200 mg/dL).

TABLE 34:

AGE STANDARDIZED PREVALENCE OF MAJOR RISK
FACTORS BY LEVEL OF EDUCATION AND SEX^{(a)(b)}


	Male			Female		
	Elementary	Secondary	Post- Secondary	Elementary	Secondary	Post- Secondary
Elevated blood cholesterol ^(c)	74	45	49	38	46	43
High blood pressure ^(d)	23	17	16	16	15	11
Smoking ^(e)	20	30	17	27	30	17
One or more of the above	84	68	60	65	64	53
Overweight ^(f)	29	33	29	33	30	18
Total number in sample	(34)	(518)	(412)	(40)	(542)	(411)

(a) Age standardization to Postcensal estimate of B.C. population, June 1, 1988, Statistics Canada.

(b) Elementary: grades 0-7
 Secondary: 8-12
 Post-Secondary: 12 and over.

(c) Blood cholesterol ≥ 5.2 mmol/L (200 mg/dL).

(d) Diastolic blood pressure ≥ 90 mm Hg and/or treatment.

(e) Regular cigarette smoking.

(f) Body mass index ≥ 27 .



TABLE 35:

AGE STANDARDIZED PREVALENCE OF MAJOR
RISK FACTORS BY METROPOLITAN, URBAN AND
RURAL AREAS AND BY SEX^{(a)(b)}

	Male			Female		
	Metro	Urban	Rural	Metro	Urban	Rural
Elevated blood cholesterol ^(c)	50	47	35	45	46	44
High blood pressure ^(d)	17	18	12	13	18	11
Smoking ^(e)	23	24	25	22	25	30
One or more of the above	68	62	53	57	64	61
Overweight ^(f)	26	39	34	17	37	32
Total number in sample	(350)	(375)	(239)	(329)	(414)	(253)

(a) Age standardization to Postcensal estimate of B.C. population, June 1, 1988, Statistics Canada.

(b) Metropolitan area: Greater Vancouver, Victoria Capital Regional District
Urban: Centres with population less than 5000
Rural: Remaining areas

(c) Blood cholesterol ≥ 5.2 mmol/L (200 mg/dL).

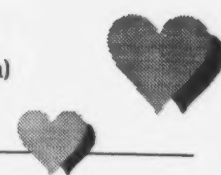
(d) Diastolic blood pressure ≥ 90 mm Hg and/or treatment.

(e) Regular cigarette smoking.

(f) Body mass index ≥ 27 .

TABLE 36:

PERCENT AWARENESS OF CAUSES OF HEART DISEASE^(a)
(ALL AGE AND SEX GROUPS COMBINED)^(b)



Cause Reported	Percent %
Smoking	51
Lack of exercise	50
Poor diet	50
Excess stress	46
Overweight	41
High blood cholesterol	35
Heredity	32
High blood pressure	29
Foods with high cholesterol	19
Excess fats	19
Excess salt	11
Overwork	11
Hardening of the arteries	11

(a) Unprompted responses, more than one response allowed.

(b) Weighted data.

TABLE 37:

PERCENT OF PARTICIPANTS WITH DIFFERENT
CHARACTERISTICS AMONG THOSE WHO COMPLETED
THE QUESTIONNAIRE ONLY, OR COMPLETED THE
QUESTIONNAIRE AND ATTENDED THE CLINIC

	Completed the Questionnaire only(a)	Attended the Clinic(b)
High blood pressure	14	15
Regular cigarette smoker	36	24
Sedentary lifestyle(c)	26	25
Post-secondary education and over	35	42
Income over \$25,000	68	70

(a) Number in the sample: 323

(b) Number in the sample: 2069

(c) Exercise less than once per week.



VII. APPENDIX I: METHODOLOGY



Population

The target population for the survey was the non-institutionalized, adult population of British Columbia (ages 18 to 74), with the exclusion of those living on Indian reserves, institutions (e.g.: prisons, hospitals) and military camps. The province of British Columbia has a total population of 2,160,800 in the age groups 18 to 74. (Statistics Canada, 1988). The unemployment rate is about the same as the national average. The economy of the province consists of forestry, fishing, mining, tourism, energy, agriculture and other related industries.

Sampling frame

The sampling frame was the computerized list of residents of the province enrolled in the Medical Services Plan File. Medical coverage is universally available in the province and practically all residents are registered with the Medical Services Plan. The File was established with the introduction of universal medical coverage in the province. Each individual record has a unique identifier with name, age, sex and address. Individuals are enrolled in the Plan at birth.

Sample selection

For the purposes of the sampling design, the province was divided into six strata. Stratum I was made up of the two

metropolitan centers: Greater Vancouver and the Capital Regional District (Victoria). Strata II, III and IV was made up of urban centers with population greater than 5,000. Stratum II contained urban centers with populations greater than 20,000; Stratum III contained centers from 10,000 to 20,000 population; and Stratum IV population centers from 5,000 to 10,000. Strata V and VI were formed from the remaining rural areas of the Province with population between 1,000 to 5,000 and less than 1,000 respectively.

The two Metropolitan areas were included in the sample with probability one. Four population centers were selected from each of Strata II through VI with probability proportional to the size of the population (ages 18 to 74) in the centers that had been grouped in the corresponding Strata. To select individuals within the centers selected in the first stage of sampling, all individuals in the Medical Services Plan File were stratified into six age and sex strata. From each stratum, a systematic random sample was selected using random starts and appropriate sampling ratios. The latter were chosen so as to obtain the expected number participants required in each selected centre.

The target sample size was 2,200 individuals. To accommodate failure-to-locate and non-response, a total sample of 5,204 individuals in the age-sex groups and areas required was drawn from the Medical Services Plan File. Of these 2,969 were located and invited to participate in the survey.

The larger sample allocation for the younger age groups (Table 2) was to obtain an even distribution of individuals expected to fall into the high risk group categories (e.g.: high blood pressure and elevated blood cholesterol) among age-sex groups. This pattern of allocation tends to yield higher precision for the prevalence estimates in the younger age groups which might constitute a priority for intervention.

Staff training

Interviewing training sessions were carried out for the public health nurses by Miss Ella MacLeod, Principal Investigator of the Prince Edward Island Heart Health Survey. Training was provided on blood pressure measurements, measurement of height, weight and drawing of blood samples. An interviewer's manual, developed by Miss MacLeod was used as a basis for training in administering the questionnaire. Training sessions also covered matters related to survey data flow, quality control and all phases of data capture.

Blood pressure

The survey staff was trained for the measurement of blood pressure using a videotape developed by Dr. George Fodor, Faculty of Medicine, Memorial University of Newfoundland, following the Guidelines of the Canadian Coalition for High Blood Pressure (1988). Standardization for identification of the Korotkoff sounds was carried out using a tape and manual developed for the Hypertension Detection and Follow-up Program, School of Public Health, University of Texas. Standard mercury sphygmomanometers, 15-inch

stethoscopes and appropriate sized cuffs were used.

The subject rested quietly for a minimum of five minutes and had been asked not to eat or smoke for a minimum of thirty minutes prior to measurement. The participant's right arm was held at the level of the heart. The maximum inflation level was determined prior to the actual measurement of blood pressure. The first and fifth Korotkoff sounds were recorded for the systolic and diastolic pressures respectively. For sounds which continued to zero mm Hg the fourth Korotkoff sound was recorded. The pulse was also recorded.

Four blood pressure readings were taken at the beginning and end of the home interview, and at the beginning and end of the clinic visit. The blood pressure data presented in this report are based on the mean of these four measurements.

Height and weight

Weight was measured using a clinic scale. Participants were dressed in normal indoor clothing without shoes. Height was measured against a wall, using a walled tape measure, with participants standing without shoes on a hard surface. For purposes of this report the height and weight data were converted to Body Mass Index values [weight(kg)/height(m) squared] at the University of British Columbia Data Processing Centre.

Blood samples

Participants had been asked to fast for twelve hours. At the clinic, the time actually fasted was recorded. A venous



blood sample was obtained in 15 ml Lavender stopper Vacutainer tube containing sodium EDTA. The filled tube was promptly mixed by inverting it eight times. The tube was labelled and stored at 4 degrees C pending centrifugation which was done within four hours of the taking of the blood specimen. The plasma was transferred to Bijou bottles by Pasteur pipettes and shipped on ice packs for lipid analysis at the Core Lipid Laboratory at the University of Toronto. This Laboratory is standardized to the Lipid Research Clinics methodology.

The lipid fractions determined were: total plasma cholesterol, triglycerides, high density lipoprotein (HDL) cholesterol, and low density lipoprotein (LDL) cholesterol. Lipid determinations were made according to the Lipid Research Clinics Laboratory Manual and met the requirements for the standardization and quality control described elsewhere (National Heart, Lung and Blood Institute, 1974). The plasma samples were not examined for lipemia.

Quality control

The Survey Monitor checked all the questionnaires for completeness and accuracy and ensured that the data flow proceeded according to protocol. Returned blood samples were checked to ascertain matching of survey identity codes and laboratory results. A duplicate blood sample was taken from every fiftieth participant to allow an independent quality control check of the analyses done at the Core Lipid Laboratory.

Ethical provisions

To ensure confidentiality, each participant was given a unique identifier, which precluded the need to have name and address on the survey instruments. A separate file was established to link name and address to the identifier for purposes of control of survey information and for referral to care services if necessary. Responsibility for the custody of this separate file rests with the Ministry of Health of British Columbia. Responsibility for the custody of the Survey data, divested of personal identifiers rests with the Principal Investigator of the British Columbia Heart Health Survey.

All participants were told of their blood pressure measurements. Those with diastolic blood pressure above 90 mm Hg were advised to see a doctor according to the Referral Guidelines of the Canadian Hypertension Society and of the Canadian Coalition for High Blood Pressure (Canadian Coalition for High Blood Pressure, 1988).

Each participant was sent a letter with the blood lipids results. Those with plasma cholesterol level above 5.2 mmol/L (200 mg/dL) were advised to see their physician.

The survey protocol was submitted and approved by the Ethical Review Committee of the Faculty of Medicine, University of British Columbia.

Data processing

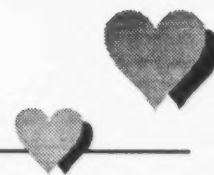
The home interview and the clinic data were forwarded to the Survey Monitor who edited and verified the completeness of the data. The data were then sent to the Survey Data Processing Center at the University of British Columbia. The Centre consolidated the information from the home interview, the clinic, including the results from the laboratory analyses, in a computerized master file.

The Survey Data Processing Centre checked all the data for inconsistencies and missing items. The inconsistencies were rectified and, whenever possible, the missing data were collected by recontacting the participants or by agreed-upon rules of imputation. Missing values for blood pressure were imputed using the mean of the available measurements for the participant. responses to knowledge and awareness questions were not imputed.

Probability weights, which are the inverse of the probabilities of inclusion of respondents in the sample, were calculated from the sample design and added to the computerized master file. Separate weights were used for information collected at the home interview and for information collected at the clinic. Non-response to the home interview or to the clinic was accommodated by adjusting the weights of the respondents. Unless otherwise stated, all the tabular estimates presented in this report are weighted.



IX. APPENDIX II: SURVEY STAFF



<i>Name</i>	<i>Health Unit</i>		
ANGEL, Lenora	Northern Interior Health Unit	HLINA, Sylvia	Cariboo Health Unit
BETKUS, Mary	Northern Interior Health Unit	JONES, Heather	Capital Regional District Community Health Services
BLAIR, Lynne	Ministry of Health	LEVERSAGE, Yvonne	North Shore Health Dept.
BONIN, Eloise	Vancouver City Health Dept.	LILLY, Pat	North Shore Health Dept.
BRODERICK, Joan	Cariboo Health Unit	LIM, Susan	Vancouver City Health Dept.
BROWN, Jocelyn	Vancouver City Health Dept.	LOHNES, Barbara	North Okanagan Health Unit
BUCHANAN, Ardis	Simon Fraser Health Unit	MACLAUCLAN, Katie	East Kootenay Health Unit
BURNS, Sheilagh	Upper Fraser Valley Health Unit	MANKOWSKE, Carol	Skeena Health Unit
CARLSON, Linda	Upper Island Health Unit	MASTERS, Alison	East Kootenay Health Unit
DANSEREAU, Jocelyn	Capital Regional District Community Health Services	MCDONALD, Liz	Boundary Health Unit
EASTMAN, Elaine	Capital Regional District Community Health Services	MILWARD, Yvonne	Upper Fraser Valley Health Unit
FRASER, Jean	Coast Garibaldi Health Unit	MITCHELL, Denise	Boundary Health Unit
HAYS, Linda	Northern Interior Health Unit	MUGFORD, Marcella	Central Kootenay Health Unit
HIGGINS, Joan	B.C. & Yukon Heart Foundation	PITMAN, Valerie	Central Kootenay Health Unit

ROZENTAL, Zaiga	Vancouver City Health Dept.
SMAHA, Carolyn	Northern Interior Health Unit
SMITH, Cindy	Capital Regional District Community Health Services
SMITH, Sharon	Northern Interior Health Unit
TALARICO, Jill	South Okanagan Health Unit
THORSON, Linda	Capital Regional District Community Health Services



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